c2: the ratio "k" at the other main-surface side,

k = s/m,

s: the fluorescent X-ray detected strength of the constituent elements of the sintering agents,

m: the fluorescent X-ray detected strength of the main-constituent elements.

REMARKS

Claims 1 through 3 are pending in this application. In response to the Office Action dated June 14, 2000, claim 1 has been amended to address antecedent basis issues. Applicants submit that the present Amendment does not generate any new matter issue.

The Information Disclosure Statement

Applicants note the Examiner's acknowledgement of the Information Disclosure Statement. However, the copy of the Form PTO-1449 furnished is only partially initialed. Applicants, therefore, request the Examiner to provide a completely initialed copy of Form PTO-1449 indicating consideration of each of the references cited.

Applicants note that the relevance of the references which have not been initialed by the Examiner are discussed in the specification, notable at page 1, lines 21 and 22, and at page 2, line 9. Adverting to the Information Disclosure Statement submitted September 16, 1999, at page 1, ultimate paragraph, it was indicated that the relevance of each non-English language reference is discussed in the specification. The

correspondence and relationships of several of the non-English language references was also made known.

Applicants, therefore, again request the Examiner to provide a completely initialed copy of Form PTO-1449 indicating consideration of each of the cited references.

Claims 1 through 3 were rejected under the second paragraph of 35 U.S.C. §112.

In the statement of the rejection, the Examiner identified antecedent basis issues. This rejection is respectfully traversed.

In response, independent claim 1 has been amended to address the antecedent basis issues raised by the Examiner. Clearly, one having ordinary skill in the art would have no difficulty understanding the scope of the claimed invention, particularly when reasonably interpreted in light of the written description of the specification. ***In re Moore, 439 F.2d 1232, 169 USPQ 236 (CCPA 1971); In re Hammack, 427 F.2d 1378, 166 USPQ 204 (CCPA 1970).***

Applicants, therefore, respectfully submit that the imposed rejection of claims 1 through 3 under the second paragraph of 35 U.S.C. §112 has been overcome and, hence, solicit withdrawal thereof.

Claims 1 through 3 were rejected under 35 U.S.C. §102 for lack f novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon U.S. Patent No. 5,424,261 (Harris '261), Chiao, Yasumoto et al., Sugiura et al., and JP 408157265 (JP '265), each taken alone.

Applicants traverse.

The Rejection under 35 U.S.C. §102

The factual determination of lack of novelty under 35 U.S.C. §102 requires the identical disclosure in a single reference of each element of a claimed invention such that the identically claimed invention is placed into possession of one having ordinary skill in the art. ***Helifix, Ltd. v. Blok-Lok, Ltd.*** ___ ***F.3d*** ___, ***54 USPQ2d 1299 (Fed. Cir. 2000); Electro Medical Systems S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994).*** In rejecting a claim under 35 U.S.C. §102, the Examiner is required to identify wherein a single applied reference identically discloses each feature of a claimed invention. ***In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).*** That burden has not been discharged. Moreover, there are significant differences between the claimed invention and each of the applied references that scotch the factual determination that any of the applied references identically describes the claimed invention within the meaning of 35 U.S.C. §102.

The Claimed Invention

Independent claim 1 is directed to a ceramic base material, e.g., aluminum nitride (claim 3), containing a specific distribution of sintering agents between opposing surfaces. It is not apparent and the Examiner has not complied with judicial requirements by pointing out wherein any of the applied references discloses the claim limitation with respect to the uniformity of distribution of sintering agents between opposing surfaces. ***In re Rijckaert, supra.; Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., supra.***

Rather, the Examiner engages in a generalization announcing a broad overlap and then resting the rejection on the theory of inherency. Applicants strenuously disagree.

There Is No Inherency

In order to invoke the doctrine of inherency, the Examiner is required to identify a basis in the applied prior art upon which to predicate the determination that the allegedly inherent result **necessarily** flows from the teachings of the applied prior art and that such would have been recognized by one having ordinary skill in the art. ***Finnegan Corp. v. ITC, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999).*** That burden has not been discharged.

Specifically, the Examiner merely asserted a general overlap **assuming** such is a sufficient basis upon which to predicate the determination that the recited uniformity distribution of sintering agents between the opposing surfaces **necessarily flows**

therefrom. However, it is **not** apparent and the Examiner has **not explained why an asserted broad overlap** of ingredients vis-à-vis other factors, such as methodology, is a sufficient basis upon which to invoke the doctrine of inherency which, as previously pointed out, requires **absolute certainty** and art-recognition, **not speculation**. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.*** Thus, on the basis alone, Applicants submit that the Examiner did not establish a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §102.

Applicants' Invention

Applicants address the problem of sintered body distortion via heat treatment after sintering. Applicants have traced that problem to the lack of uniformity in the distribution of sintering agents. Applicants have addressed and solved that problem by controlling the uniformity of distribution of sintering agents by strategic charging of the mold, as in the disclosed embodiments. For example, disclosed embodiments include selecting the type of setter and arraying method for the setter and the mold. In this respect, Applicants refer to page 10 of the written description of the specification, lines 2 et seq. Significantly, the Examiner has not disputed the disclosed relevance of mold charging conditions on the uniformity of distribution of sintering agents as claimed. ***In re Clinton, 527 F.2d 1226, 188 USPQ 365 (CCPA 1976).***

Accordingly, the manipulative steps involved in producing the claimed ceramic base material, notably the mold charging conditions, must be strategically controlled in order to obtain the uniformity of distribution for sintering agents between opposing

surfaces. That concept is **alien** to the applied prior art. Indeed, there is **no** apparent basis of record upon which to **assume** that **any** method of mold charging would necessarily yield a product having the recited uniformity distribution of sintering agents between opposing surfaces.

Yasumoto et al. and JP '265

The objectives of Yasumoto et al. and JP '265 are completely different from the objectives of the present invention. Yasumoto et al. seek to improve the adhesion strength between aluminum nitride ceramics and a metallized layer (column 1 - column 2). JP '265 also seeks to improve the adhesion strength as described on pages 3 and to curtail raw material cost.

On the other hand, the present invention seeks to suppress increased distortion upon heat treatment after sintering which objective is alien to these references. Certainly, neither Yasumoto et al. nor JP '265 recognize the warpage problem or suggest any method of charging the mold at the time of sintering to address that problem. It is, therefore, not apparent wherein resides the basis upon which to conclude that the methods employed by either of these references would **necessarily** yield the claimed ceramic base material having the specified uniformity distribution of sintering agents between opposing surfaces. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Chiao

Chiao is concerned with a co-fired metallizing method to form a non-sintered metallized layer on a ceramic layer comprising a sheet-form mold of ceramics of aluminum nitride. The formed layers are subsequently laminated in multi-layers, and then the ceramic layer and the metallized layer are simultaneously sintered. An objective of Chiao is to provide a multi-layer structured free from warpage or delamination between the layers. Chaio's warp reduction method, as disclosed in column 1 through column 3, resides in controlling the purity of the main components in the ceramic layer and metallized layer and their particle sizes, as well as controlling the co-fire temperature of the raw materials sub-component composition to produce liquid phase formation of the two layers and to make their sintering temperatures approximately at the same level. As a result (as shown in TABLE V) a multi-layered substrate having reduced warpage at less than 0.0030 inches/inch (3μm/mm) is obtained. As described under TABLE V, ordinarily a warpage amount of no more than 10μm/mm is obtained.

In contradistinction to the objectives of Chiao, in accordance with the present invention, warpage of the **ceramic substrate itself is reduced**. The method of reducing warpage in accordance with the present invention, as previously stressed, resides in strategically controlling charging of a mold at the time of sintering, as by selecting the appropriate type of setter and arraying method for the setter and the mold, thereby reducing the concentration difference of the sintering agent components between the two main surfaces (thickness direction) in the sintered body. This technique is clearly **different** from that employed by Chiao. Accordingly, it is not apparent and the Examiner

has not explained why the methodology of Chiao could somehow serve as a basis upon which to predicate the determination that the resulting article **necessarily** coincides with that claimed, particularly the recited uniformity of distribution of sintering agents between opposing surfaces.

Indeed, Chiao does not disclose nor suggest in any way a mold charging technique at the time of sintering. Chiao does not suggest any manner of addressing increased warpage caused by heat treatment after sintering. The level of warping of the ceramic substrate obtainable by the present method differs considerable from that of Chiao at no more than 0.1 μm/mm.

Applicants stress that Chiao neither discloses nor suggests a level of concentration difference of a sintering agent as in claim 1 of the present application. Indeed, the difference in methods employed in the present invention vis-à-vis Chiao necessarily leads to a different product.

Sugiura et al.

Sugiura et al. disclose a method of piling up the sheet-form molding product of aluminum ceramic to sinter (column 2, line 26 through column 3, line 31). As shown as Exhibit A hereto, aluminum nitride molding sheets are piled up through a thin layer of ceramic powder. The laminates are then piled up and arranged on the ceramic support base and sintered. However, in accordance with this process, warping of the sintered product is not resolved. As disclosed in column 4, lines 47 and 48, "the sintered

rectangular pieces which were warped were collected". Thus, in order to reduce warping, the step of **warping correction**, as described in Exhibit A, hereto is necessary. In accordance with the methodology of Sugiura et al., the sintering process is accompanied by warping. As disclosed by Sugiura et al., the sintering process is designed to prevent mutual sticking of the molding products.

In contradistinction to the methodology of Sugiura et al., in accordance with the present invention, a reduction of warping is obtained by the sintering process only. In the methodology of Sugiura et al., a simple powder layer is interposed between the molding products, and a solidified product is not used as in the present invention. In Sugiura et al., there is no disclosure of the level of concentration difference of the sintering agent as set forth in claim 1.

Indeed, in view of the dramatic difference in the manufacturing techniques between the present invention and the methodology of Sugiura et al., the resulting products would necessarily be different, not identical as **assumed** by the Examiner. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.*** Indeed, it would appear that the product resulting from the methodology of Sugiura et al. exhibits a greater concentration difference of sintering agents in a thickness direction than the present invention, even upon subsequent treatment at a lower temperature than that at the sintering temperature, since the concentration difference would not be reduced. The Examiner has not identified any basis upon which to predicate the determination that the product resulting from the methodology of Sugiura et al. would **necessarily** exhibit the uniformity of

distribution of sintering agents between opposing surfaces as specified in the claimed invention. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Harris '261

The invention disclosed by Harris '261 employs a CaO-Al_2O_3-B_2O_3 based glass pulverized product (CAB glass) and a rare earth element oxide as sintering agents seeking to provide an aluminum nitride substrate that allows small deformation such as warping together with cost reduction by low temperature sintering. In order to attain reduced warping, it is necessary to add the above specific glass composition as a sintering agent to AlN, to sinter at a low temperature of 1550 to 1700°C and then apply a low load to the molding product during sintering (column 4, lines 15 through 46).

The steps taken by Harris '261 are not necessary in the present invention. Moreover, Harris '261 neither discloses nor suggests any particular method of charging the mold at the time of sintering as in the present invention. Moreover, Harris'261 does not disclose the warping level of the resulting sintering product or the concentration distribution level of the sintering agent as set forth in independent claim 1. As the methodology of Harris '261 differs from the methodology of the claimed invention, it can not logically be assumed that the resulting product would **necessarily** exhibit the uniformity of distribution of sintering agents between opposing surfaces as specified in independent claim 1. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Evidence of Lack of Inherency

Exasperating the lack of any basis upon which to predicate the determination that the methodology employed by any of the applied references would necessarily yield the claimed ceramic base material having the recited uniformity distribution of sintering agents between opposing surfaces, is an abundance of evidence in the specification which has been improperly ignored by the Examiner. Specifically, adverting to Table II in the written description of the specification, data is presented demonstrating that all **not all** sintered nitride bodies, particularly aluminum nitride, would **necessarily** exhibit the same uniformity of distribution of sintering agents between opposing surfaces. It can not be gainsaid that the distribution of sintering agents between opposing surfaces impacts warpage subsequent to sintering.

Conclusion

The bottom line is that the Examiner did not provide the requisite factual basis upon which to predicate the determination that the methodology employed in any of the applied references would **necessarily** yield the claimed ceramic base material exhibiting the uniformity of distribution of sintering agents between opposing surfaces as specified in independent claim 1. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.*** Any such determination would **improperly be predicated upon speculation**. ***Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.,supra.; In re Rijckaert, supra.; Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 20 USPQ2d 1746 (Fed. Cir. 1991); In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981).*** Moreover, the evidence in the specification undermines any such improperly **assumed** inherency.

The Rejection Under 35 U.S.C. §103

Simply put, the Examiner did not discharge the initial burden of establishing a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §103 for lack of the requisite factual basis and want of the requisite realistic motivation. The Examiner did not make any **particular findings** as to any **specific understanding** or **specific principle** which would have **realistically** impelled one having ordinary skill in the art to modify the product of any of the applied references to arrive at the claimed invention. ***In re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000).***

Conclusion

The Examiner did not establish a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §102 or 35 U.S.C. §103. Applicants, therefore, respectfully submit that the imposed rejection of claims 1 through 3 under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon Harris '261, Chiao, Yasumoto et al., Sugiura et al., and JP '265, each taken alone, is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 1 through 3 were also rejected under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon U.S. Patent No. 5,773,377 (Harris '377).

This rejection is respectfully traversed.

As in the previous rejection, the Examiner invoked the doctrine of inherency. However, as previously argued, in order to invoke the doctrine of inherency, the Examiner is obliged to identify a basis upon which to predicate the determinations that the allegedly inherent feature, i.e., the recited uniformity of distribution of sintering agents between opposing surfaces, would **necessarily** flow from the teachings of the applied prior art and would have been recognized by one having ordinary skill in the art. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.*** That burden has **not** been discharged.

As previously pointed out, the uniformity of distribution of impurity agents recited in independent claim 1 stems in part from the manner in which the mold is charged at the time of sintering, e.g., selecting the type of setter and array for the setter and the mold. Mere **generalizations** with respect to an overlap of ingredients has **not** been shown to be a sufficient basis upon which to predicate the determination that the resulting products would **necessarily** exhibit the same uniformity of distribution of sintering agents.

Applicants would stress that an object of Harris '377 is to provide aluminum nitride ceramics which can be sintered at a lower temperature (column 8, lines 13 through 24), and to provide a multi-layered metallized substrate which can be co-fired at a low temperature and which exhibits small deformation (column 8, lines 21 through 25). The methodology disclosed by Harris '377 requires a Y_2O_3-CaO-Al_2O_3 based specific glass composition sintering agent added to AlN, and the molded product is sintered at 1550 -

1800°C, after which it is heat treated at a temperature lower than the sintering temperature (claim 17). In the case of co-fired, multi-layered metallized substrates, the selection of the glass composition for low temperature sintering becomes feasible and a substrate having small deformation is obtained.

However, as disclosed in column 20 of Harris '377, Example B, warping is of the order of 1.5 mils/inch (1.5μm/mm). This level of warpage is considerable **larger** in comparison than the warpage of 0.1 μm/mm obtained in accordance with the present invention. Indeed, Harris '377 neither discloses nor suggests any particular strategic mold charging method at the time of sintering as in the present invention. Furthermore, Harris '377 makes no mention of the concentration difference of the sintering agents in the thickness direction as specified in claim 1. Rather, in view of the dramatic difference in methodology of the present invention vis-à-vis that employed by Harris '377, it can not logically be concluded that the product obtained by the methodology of Harris '377 necessarily corresponds to that specified in independent claim 1, particularly as to the uniformity of distributing of sintering agents between opposing surfaces. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Moreover, as previously pointed out, the data in Table II in the written description of the specification undermines the notion that all sintered bodies, particularly aluminum nitride sintered bodies, regardless of the methods by which they were produced, exhibit the same uniformity of distribution of sintering agents between opposing surfaces which, as the evidence also reveals, impacts warpage subsequent to sintering.

It is, therefore, apparent that the Examiner did not establish a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §102. Moreover, the Examiner has not established the requisite realistic motivation which would have impelled one having ordinary skill in the art to modify the structure of Harris '377 to arrive at the claimed invention. ***In re Kotzab, supra***.

Applicants, therefore, respectfully submit that the imposed rejection of claims 1 through 3 under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon Harris '377 is not factually or legally viable and, hence, solicit withdrawal thereof.

Accordingly, it is urged that the application, as amended, overcomes the rejection of record and is in condition for allowance. Favorable consideration of this application is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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EXHIBIT

"A"

Sugiura '983's warping reduction method